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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/564,161
Filing Date: February 21, 2006
Appellant(s): VON SCHROETER ET AL.

Donald L. Dennison
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed on 12/28/2009 appealing from the Office action mailed 7/01/2009

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

.(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,466,831	Shibata	10-2002
6,664,986	Kopelman	12-2003

2002/0060663	Wang	05-2002
2002/0010568	Rubbert	01-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 34, 2-5, 8-11, 26-28, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al (US. 6,466,831 B1), and in view of Kopelman et al (US. 6,664,986 B1, already of record).

Regarding claim 34, Shibata et al teaches a method for displaying a digitized technical object on a monitor, utilizing a right-angled coordinate system with X, Y and Z axes (Fig. 5A, x,y,z coordinates), whereby the Z-axis and the Y-axis and the intersection or origin of the coordinate system, of the axes in the image plane of the monitor and the X-axis run perpendicular to the image plane and the technical object is rotated about two axes running perpendicular to each other and is shifted along the X-axis for zooming the object (Fig. 5A-5C, axes perpendicular to each other, rotations; Fig. 5D, zooming);

The improvement comprising, the technical object is aligned along a T-axis running in a plane defined by the X-axis and the Y-axis and passing through the origin of the coordinate and is moved to a maximum of five degrees of freedom, whereby a rotation (Rot_z) about the Z-axis is chosen as the first degree of freedom, a rotation (Rot_t) about the T-axis is chosen as the second degree of freedom, a translation of the object along the T-axis is chosen as the third degree of freedom and the translation of the object along the X-axis is chosen as the fourth degree of freedom (column 6, line 36-column 7, line 25, various rotations and translations, totally six degrees of freedom. One of degrees of freedom can be ignored to match the five degrees of freedom. The T-axis in the instant claim would be the same the new Y-axis in Shibata after a rotation about z-axis);

Shibata et al does not explicitly teach a longitudinal axis of the dental technical object is formed by a traverse polygon with straight lines connecting sections of said dental technical object, for shifting the said dental technical object along the T-axis, the

object is shifted along a straight line of the traverse polygon which passes through the origin of the coordinate system. However, this limitation is about how to position and align the model object in the coordinate system. Shibata et al allow the user to position and align the object according to user's preference. The positioning and alignment of the object in the coordinate system are all up to the choices of the users, which is considered as design choice.

Shibata et al does not explicitly teach for shifting the dental technical object along consecutive first and second straight lines forming an angle ß which is ≠180°, the object is rotated about the angle ß about the z-axis after completion of the shifting along the first straight line before shifting the dental technical object along the second straight line. However, this limitation is about how to move the model object in the coordinate system. Shibata et al allow the user to move the object according to user's preference. The movements of the object in the coordinate system are all up to the choices of the users, which is considered as design choice.

However, Shibata et al does not teach that the object is a dental object, such as a dental prosthesis or a model of at least one tooth or of an area of the jaw to be provided with a dental prosthesis.

Kopelman et al teaches modeling 3D dental objects (abstract, Fig. 1 and 3) using computers. The computer implemented 3D modeling provides a graphical view without creating the actual object.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Shibata et al and Kopelman et al to model dental object in 3D for the benefit of graphical view of the object without creating the actual object.

Regarding claim 2, Shibata et al teaches a method according to claim 34, wherein the technical dental object is moved to a maximum of the first, second, third and fourth degrees of freedom (column 6, lines 24-35, totally six degrees of freedom, any one or combinations of the six would result in the first to fourth degrees of freedom).

Regarding claim 3, Shibata et al teaches a method according to claim 34, wherein a fifth degree of freedom, a rotation (Rot_x) of the object around the X-axis is chosen (Fig. 5C, rotation around x-axis).

Regarding claim 4, Shibata et al teaches a method according to claim 34, wherein the technical dental object is rotated at an angle α about the T-axis, and wherein $\alpha<360^{o}$, and preferably $\alpha \leq 180^{o}$ (Rotation as in Fig. 3A, then rotation as in Fig. 3B choosing the new y axis as T-axis).

Regarding claim 5, Shibata et al does not explicitly teaches a method according to claim 34, wherein the technical dental object is displayed on the monitor in such a way that the technical dental object is independent of its movement or presentation is passed through by the origin of the coordinate system. However, it would have been well known that the technical object can be independent of its movement or presentation is passed through by the origin of the coordinate system.

Claims 8-11 describe how to position the object in the coordinates. They are all up to the choices of the users.

Regarding claim 26, Shibata et al teaches a method according to claim 34, wherein an input device is employed for aligning the object on the monitor, said input device having input elements by which the alignment of the object is carried out at the respective degrees of freedom independent of each other (column 6, lines 39-67. Mouse, rotations by using mouse).

Regarding claim 27, Shibata et al teaches a method according to claim 26, wherein said input device has four input elements (Fig. 1, mouse; four input elements as switches 8 and 9, ball 4, body 3).

Regarding claim 28, Shibata et al teaches a method according to claim 26, wherein a changeover switch is used for one of said input elements (Fig. 1, mouse; column 6, lines 50-53, switch 9).

Regarding claim 31, Shibata et al teaches a method according to claim 26, wherein the technical object is moved in a restricted manner by the optional operation of individual input elements as well as combined operation of two input elements around four degrees of freedom (column 6, line 39-column 7, line 25, individual or combined operations of input elements).

Claims 15, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al, and in view of Kopelman et al, as applied to claims 34 and 26 above, and further in view of Wang (US. Pub. 2002/0060663 A1).

Regarding claims 15, and 29-30, the combination of Shibata et al and Kopelman et al remains as applied to claims 34 and 26 above. However, the combination does not teach wherein an adjusting wheel is used as one or several input elements; wherein

said input device is a trackball that functions for at least two of said input elements; and wherein, when said trackball is used as one of the input elements, the dental technical object is rotated about the first and second axes as well as about an axis running perpendicular to this axis by analogous rotation of the trackball.

Wang teaches an input device which has input elements of an adjusting wheel and a trackball (Fig. 11, 198, 104). These additional input elements provide the ability or convenience of direct manipulations of 3-D objects or movements for some applications (paragraph [0012]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the input device used in the combination of the procedures in Shibata et al and Kopelman et al to include an adjusting wheel and a trackball as shown in Wang to perform some of the movements for convenience of direct manipulations of 3-D objects.

Claims 19-20, 22, and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kopelman et al, and in view of Rubbert et al (US. Pub. 2002/0010568 A1), and further in view of Shibata et al.

Regarding claim 19. Kopelman et al teaches a method for displaying digital dental prosthesis on the basis of digitized data of a jaw area to be provided with the dental prosthesis (Figs. 2 and 3), displaying at least the dental prosthesis on a monitor (Fig. 2, and column 2, lines 65-67), evaluating the displayed dental prosthesis by moving the dental prosthesis on the monitor in various degrees of freedom (Figs 2 and 3).

However, Kopelman et al does not explicitly teach computing the dental prosthesis based on the digitized data, a maximum of five degrees of freedom, and , if necessary, modifying the displayed dental prosthesis and the subsequent manufacture of the dental prosthesis on the basis of the data that correspond to the displayed dental prosthesis .

Rubbert et al, in the same field of endeavor, teaches computing the dental prosthesis based on the digitized data (e.g., paragraph [0017], designing and calculating archform), and, if necessary, modifying the displayed dental prosthesis (e.g., paragraph [0018], changing position of virtual brackets and teeth) and the subsequent manufacture of the dental prosthesis on the basis of the data that correspond to the displayed dental prosthesis (paragraph [0065], customized orthodontic archwire based on the virtual model is manufactured.). Rubbert et al provides an interactive treatment planning and service system. In addition, Shibata et al teaches a fully 3D manipulation of the virtual object in six degrees of freedom, which is fully capable of operating in five degrees of freedom.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the methods as shown in Kopelman et al, Rubbert et al, and Shibata et al by computing the dental prosthesis based on the digitized data, manipulating displayed in five degrees of freedom and modifying the object if necessary, and manufacturing the dental prosthesis for the benefit of an interactive dental treatment planning and services.

Regarding claim 20, Kopelman et al teaches a method according to claim 19, wherein the dental prosthesis and the jaw area to be provided with the dental prosthesis are displayed on the monitor (Fig. 2, the model of artificial denture on the monitor).

Regarding claim 22, Rubbert et al teaches a method according to claim 19, wherein the dental prosthesis displayed on the monitor is modeled by electronic modification of the data (Paragraph [0106], when changing any parameter, the change is immediately reflected in the view of the model of the dentition).

Regarding claim 32, Rubbert et al teaches a method according to claim 19, wherein the digitized data of the jaw area to be provided with the dental prosthesis, that is taken as a basis for computing the dental prosthesis, is linked with stored parameters such as wall thickness of the dental prosthesis or the cement gap between the dental prosthesis and the jaw area and that from data so attained, the dental prosthesis is computed and displayed on the monitor (paragraph [0065], obtaining the three-dimensional digital data of the patient's teeth from the scanning node and displaying the model.)

Regarding claim 33, Kopelman et al teaches a method according to claim 19, wherein the dental prosthesis and/or jaw area are moved on the monitor to a maximum of four degrees of freedom (Figs. 2 and 3: Operations in four degrees of freedom: (1) elevating or translating along z axis, (2) rotating about z axis, (3) zooming, which is like moving toward or away from the viewer, (4) opening or closing the jaw.).

(10) Response to Argument

Appellant, on page 9 of Brief, argues that:

The Examiner has pieced together various details from two or three different prior art

disclosures in order to tailor a rejection based upon obviousness (35 U.S.C. 103(a)). In none of these citations is there any suggestion or impetus for such combination of teachings.

It has long been held that obviousness cannot be established or predicated by combining teachings of prior art to produce the claimed invention, absent some teaching or suggestion supporting such combination. See ACS-Hospital Systems, Inc. v. Montefiore Hospital et al. 221 USPQ 929(Fed. Cir. 1984. Also note Ex parte Willems 84 USPQ2d 1350 (Bd. Pat. App. & Int. 2006).

The examiner respectfully disagrees. According to MPEP, "The rationale to modify or combine the prior art *does not have to be* expressly stated in the prior art; the rationale may be expressly or impliedly contained in the prior art or it may be reasoned from knowledge generally available to one of ordinary skill in the art," ... see MPEP 2144. In the current case, the instant claim is direct to a method for displaying a dental prosthesis on a monitor, utilizing a right-angled coordinate system with X, Y and Z axes. The prior art of Shibata et al discloses method and system, including computer hardware and software, for displaying and manipulating any 3-D objects on the computer monitor, utilizing a right-angled coordinate system with X, Y and Z axes (Figs. 3 and 5). One of ordinary skill in the art would understand that such a system in Shibata et al can be meaningful only when it has some applications. Displaying dental model is such an application. Kopelman et al is such an application for modeling dental object. Therefore Shibata et al and Kopelman et al are combinable based on the

knowledge generally available to one of ordinary skill in the art. That is, it is proper to use the combination of Shibata et al and Kopelman et al to show the obviousness of the instant claims.

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Appellant, on pages 9-11 of Brief, argues that:

I. First ground of rejection Shibata et al. (U.S. 6,466,831) has been cited by the Examiner to show a method for displaying a digitized object on a monitor using an X-Y-Z coordinate system. The system makes no mention of use in a dental environment. The arrangement relates to the art of technical 3D-CAD systems. The patent is silent with regard to restriction of the display of the object such that it can be moved to a maximum of five degrees of freedom as provided by the present invention.

Patent claim 34 defines the degrees of freedom clearly, namely a rotation about the Z-axis, a translation along the X- axis, and a translation and rotation about an additional T- axis running in the X/Y plane and originating from the point of origin of the coordinate system. The dental prosthesis or object is displayed aligned along the T-axis. Such arrangement is not suggested by Shibata.

It is not possible with Shibata to have a movement to a maximum of five degrees of freedom nor is an additional axis provided relative to which the object is aligned.

The representation of a dental object is in fact shown by Kopelman et al. (U.S. 6,664,986). This patent discloses a computer interface for use in the orthodontic field. No suggestion can be found in this patent for aligning the prosthesis or object along an

axis running in a plane defined by both X and Y axes. Rotation and movement about and along the T-axis is not anticipated by Kopelman et al.

According to Kopelman et al. (column 3, lines 4 et seq., a series of steps are suggested relating to the graphic user interface, however, neither a T-axis nor a polygon line are used for displaying an elongated dental object and shifting the same.

The Examiner has made certain general comments when there is no teaching in the prior art, such as "an obvious variance", "they are all up to the choices of the users" and "the degree of freedom is considered as an obvious variance". No comment is made as to why these claimed elements or steps are obvious.

Before getting into the detail arguments in this section, it is helpful to present some relevant background information and observation. First, in order to describe a complete motion of a three dimensional rigid body, a coordinate system which can represent six degrees of freedom is required. A Cartesian coordinate system is generally used for such a purpose. In there, the object can have translational motions (i.e., shifting) along X axis, Y axis, and Z axis. These are the three degrees of freedom. In addition, the object can rotate about X axis, Y axis, and Z axis. These are the additional three degrees of freedom. *Any* motion can be described by one of or combination of up to six of the independent motions. It is general knowledge to one of ordinary skill in the art, which can be found in college math or physics textbooks. Shibata et al discloses such a Cartesian coordinate system, implemented with computer hardware and software. Second, once a system as in Shibata et al is available, a user,

normally using an input device, such a mouse, would be able to make or control the movement of the 3-D object on the screen. The user would be able to align the object in certain direction as preferred. For example, if the object is elongated, one can align the longest dimension with a chosen axis like Z. The user would also be able to choose a series of movements, for example, shifting along the first axis, then rotating about second axis, and then shifting again, etc. Any of these alignments or movements are considered as obvious variations from each other, and not considered as patentably distinguishable. Third, although in some case, the full six degrees of the freedom are available, the user may not necessarily use all six. In other words, availability of six degrees of the freedom includes availability of degrees of the freedom less than six. That is, it is obvious to reduce six degrees of the freedom to five. But it would not be so obvious to increase five degrees of the freedom to six.

Based on prior art of Shibata et al and Kopelman et al, and the relevant general information, the examiner's answers to the above Appellant's arguments are as following:

Regarding the first paragraph, Shibata et al's system makes no mention of use in a dental environment. However, Shibata et al's system is applicable to dental environment, as shown in Kopelman et al. The patent of Shibata et al is silent with regard to restriction of the display of the object such that it can be moved to a maximum of five degrees of freedom as provided by the present invention. However, availability of six degrees of the freedom includes availability of five degrees of the freedom.

Regarding the second paragraph, all the movements and the alignment are available in Shibata et al's system. Specifically, Shibata et al explicitly discloses a rotation about the Z-axis (Fig. 3), a translation along the X- axis (Fig. 3). There is no explicit disclosure about a translation and rotation about an additional T- axis running in the X/Y plane and originating from the point of origin of the coordinate system and that the dental prosthesis or object is displayed aligned along the T-axis. However, a translation and rotation about an additional T- axis can be obtained by the combination of other motions in Shibata et al. Such an alignment of object is also available to the user.

Regarding the third paragraph, as to the second paragraph, all movement possible in the instant claim is possible in Shibata et al.

Regarding the fourth and fifth paragraphs, Kopelman et al provides an example of 3-D modeling, such as in Shibata et al, for the dental object. The actual alignments and movements of the object are available in Shibata et al, see answer to second paragraph above.

Regarding the sixth paragraph, as shown in the background information, as long as the facility or the tool, or the system of manipulating the object (shifting, rotation, alignment, etc.) is available, a specific action (e.g., how long and along which axis to shift, how many degrees and about which axis to rotate) is up to user's preference or choice. Therefore the examiner considers those as obvious variances.

Appellant, on page 11 of Brief, argues that:

2. Second ground of rejection This rejection relies on the prior art noted immediately above taken in further view of Wang. This last patent is relied upon for the teaching of a computer input device such as a mouse having an adjusting wheel and trackball for direct manipulation of three- dimensional objects. Applicants are not claiming such an input device per se, which admittedly is old, but rather in combination with the additional elements set forth in parent Claim 34 and other claims dependent therefrom.

The examiner's answer to the above Appellant's arguments is as following: Wang is introduced to show that the trackball in the instant claims are available at the time of the invention was made. A trackball, like other input device, would be a suitable device as applied to the instant claims.

Appellant, on pages 11-12 of Brief, argues that:

3. Third ground of rejection This ground of rejection relates to the claims directed to a method for manufacturing dental prostheses and wherein Claim 19 is the parent claim from which the remainder depend. The Examiner has rejected these claims as unpatentable over the combination of three references Kopelman et al. in view of Rubbert et al. and in further view of Shibata et al.

These claims require that the digitized data for a dental object (prosthesis) is displayed on a monitor and is moved on the monitor to a maximum of five degrees of freedom. There is no support for the rejection and comment that the "five degrees of freedom" recitation is "an obvious variance"

As previously noted, Shibata et al. is not concerned with a method of displaying an object on a monitor screen, but rather to a three-dimensional data input device. This is a typical of the state of the art and fails to show any relationship to the dental arts or technology nor does it have any regard for the restriction of the display of the object such that the same can be moved to a maximum of five degrees of freedom.

Kopelman provides no suggestion that a dental object or prosthesis can be manufactured on the basis of the object that is digitized and displayed on the monitor.

The examiner respectfully disagrees. In addition to all issues which are already addressed above, the examiner would like to pointed out that, in contrary to the statement of Appellant that "Shibata et al is not concerned with a method of displaying an object on a monitor screen, but rather to a three-dimensional data input device", Shibata et al not only discloses a three-dimensional data input device, but also its application in the computer system used to display and manipulate the 3-D object on the computer screen (column 2, lines 19-33, column 8, lines 34-41).

In addition, although Kopelman provides no suggestion that a dental object or prosthesis can be manufactured on the basis of the object that is digitized and displayed on the monitor, Rubbert et al does. Rubbert et al teaches manufacture of the dental prosthesis on the basis of the data that correspond to the displayed dental prosthesis (paragraph [0065], customized orthodontic archwire based on the virtual model is manufactured.).

In summary, the combination of Shibata et al and Kopelman et al, as well as other referenced prior art, is proper in the rejections of the claims in the instant application. It shows the obviousness of the claims to one of ordinary skill in the art at the time of the invention was made.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Tize Ma

/Tize Ma/

Examiner, Art Unit 2628

Conferees:

/XIAO M. WU/

Supervisory Patent Examiner, Art Unit 2628

/Kee M Tung/

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